REMARKS

This is intended as a full and complete response to the Office Action dated March 18, 2008, having a shortened statutory period for response set to expire on June 18, 2008. Please reconsider the claims pending in the application for reasons discussed below.

Claims 1-31 are pending in the application and are shown above. Claim 20 has been amended to clarify the invention. Claims 1-31 are rejected. Reconsideration of the rejected claims is requested for reasons presented below.

Rejections under 35 U.S.C. § 103

Claims 1, 3-11, 13-23, and 25-31 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Iseki, et al.* (US 6174371, hereafter "*Iseki*"), further in view of *Gomi* (US 5288325 A, hereafter "*Gomi*").

To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *In re Royka*, 490 F.2d 981, 985 (CCPA 1974). Additionally, there must be "a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed. *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1742, 167 L.Ed.2d 705, 75 USLW 4289, 82 U.S.P.Q.2d 1385 (2007). Finally, to establish a *prima facie* case of obviousness there must be a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). Furthermore, the reason that would have prompted the combination and the reasonable expectation of success must be found in the prior art, common knowledge, or the nature of the problem itself, and not based on the Applicant's disclosure. *DyStar Textilfarben GmbH & Co. Deutschland KG v. C. H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006); MPEP § 2144. Underlying the obvious determination is the fact that statutorily prohibited hindsight cannot be used. *KSR*, 127 S.Ct. at 1742; *DyStar*, 464 F.3d at 1367.

Applicants respectfully assert that *Isek, et al.* and *Gomi*, when combined and considered together as a whole, do not describe, teach, or suggest a first and second

carrier gas combined with a precursor to form a process gas and a gas analyzer to generate a signal indicative of a concentration of the precursor in the process gas, as recited in independent claims 1, 11, and 23, and these differences between claims 1, 11, and 23 and the combined teachings of the cited references would not have been obvious to one of ordinary skill in the art at the time the invention was made.

Iseki discloses an apparatus for heating a substrate in a stable atmosphere, without permitting the vapor of a treating liquid to condense on the substrate (Abstract). In this apparatus, a carrier gas at a constant rate is bubbled through a tank of a treating liquid (Column 7, Lines 36-44; Figure 2) and combined with a diluting gas at mixer 38 (Figure 2). The main controller controls the flow of the control valve 39, adjusting the flow of the diluting gas so that the vapor of the treating liquid in the mixture has a partial pressure which increases with time, which means the controller 72 decreases the flow of the diluting mixture by at least partially closing control valve 39 in order to increase the vapor pressure of the treating liquid in the vapor mixture (Column 9, Lines 8-13).

Additionally, *Iseki* discloses a vapor temperature regulator 31 that cools the vapor of the treating liquid from the vaporizer 10 to a level close to the substrate treating temperature in the treating chamber to prevent condensation of the treating liquid vapor on the wafer (Column 8, Lines 4-21). *Iseki* also discloses a heater 40 for heating the diluting gas to a temperature close to the substrate treating temperature in the treating chamber 50 (Column 8, Lines 26-32) and a heater 54 in the main body 52, both used for preventing the condensation of the treating liquid vapor on the wafer and the walls of the main body 52 (Column 8, Lines 42-45). The controller 72 in *Iseki* only controls the treating chamber 50 temperature, the diluting gas temperature, the vapor mixture temperature, the diluting gas flow rate by valve 39, and the mixed gas flow rate by valve 41. Furthermore, the flow of the carrier gas is not controlled by an independent valve nor is it controlled by the main controller.

Gomi teaches an apparatus for supplying vaporized raw material to a reaction unit 43 and a controller for controlling the flow rate of carrier gas by using thermal conductivity sensors in the primary and secondary pipes for a bubbler 41 to determine the TEOS gas concentration in the secondary pipe.

The Examiner asserts at Page 8 of the Office Action that it would have been obvious to a person of ordinary skill in the art, at the time the invention was made, to add the gas analyzer in *Gomi* to the apparatus in Figure 2 of *Iseki*. Contrary to the Examiner's assertion, a person having ordinary skill in the art would not have been motivated to combine the thermal conductivity sensors 46, the controller 47, and the mass flow meter 44 in *Gomi* with the apparatus in Figure 2 of *Iseki*. The teachings of *Iseki* are for an apparatus that controls the temperature of the process gas to prevent condensation of the treating liquid vapor on the substrate being processed whereas the teachings of *Gomi* are for an apparatus that adjusts the flow rate of the carrier gas by measuring the TEOA gas concentration using a thermal conductivity sensor. A person having ordinary skill in the art, at the time the invention was made, would not be motivated to combine a thermal conductivity sensor that analyses gas concentration with an apparatus for controlling temperature of a process gas to prevent condensation on the wafer.

Even assuming, *arguendo*, that it would have been obvious to one of ordinary skill in the art to add the thermal conductivity sensors 46, the controller 47, and the mass flow meter 44 in *Gomi* to the apparatus in Figure 2 of *Iseki*, the resulting structure would not include each of the elements and limitations recited in independent claims 1, 11, and 23.

If one of ordinary skill in the art were to add the thermal conductivity sensors 46, the controller 47, and the mass flow meter 44 in *Gomi* to the apparatus in Figure 2 of *Iseki*, the resulting structure would not include a first carrier gas, a second carrier gas, and a precursor gas combined into a process gas that is analyzed by a gas analyzer to generate a signal indicative of a concentration of the precursor in the process gas.

Applicants note that thermal conductivity sensors 46 used to measure the treating liquid gas concentration and the mass flow meter 44 in *Gomi* are positioned along the primary and secondary pipes, that is the mass flow meter 44 and a thermal conductivity sensor are located along the carrier gas pipe going into the vessel 42 and another thermal conductivity sensor is located along the vapor mixture transmitting pipe leaving the vessel to the reaction unit 43, as shown in Figure 4 of *Gomi*. Therefore, one of ordinary skill in the art, in adding the mass flow meter 44 and thermal conductivity sensors 46 of *Gomi* to the treating vapor mixture generating unit 30 of *Ideki* would have been motivated to place the

thermal conductivity sensors 46 along gas feed pipe 13 and transmitting pipe 14 and a mass flow meter attached to gas feed pipe 13. As a result, the diluting gas 42 would not pass through the thermal conductivity sensors of *Gomi* located on gas feed pipe 13 and transmitting pipe 14. Consequently, the resulting structure would not include a first carrier gas, a second carrier gas, and a precursor gas combined to form a process gas that is analyzed with a gas analyzer to generate a signal indicative of a concentration of the precursor in the process gas.

Therefore, the Applicants respectfully submit that *Iseki* and *Gomi*, alone or in combination, do not teach, show, suggest, or otherwise render obvious a first valve adapted to regulate a first carrier gas flowing into the vessel, whereby the first carrier gas is combined with the precursor, a gas analyzer having an ultrasonic transducer adapted to generate a signal indicative of a concentration of the precursor in the process gas, and a controller configured to calculate a mass flow rate of the precursor based on the signal, as recited in claim 1, and claims dependent thereon.

Also, the Applicants respectfully submit that *Iseki* and *Gomi*, alone or in combination, do not teach, show, suggest, or otherwise render obvious a precursor monitoring apparatus disposed between the process chamber and the vessel, wherein the precursor monitoring apparatus has a gas analyzer to generate a signal indicative of a concentration of the precursor in the process gas or the signal is indicative of the flow rate of the precursor, and an integral controller to receive the signal, as recited in claim 11, and claims dependent thereon.

Also, the Applicants respectfully submit that *Iseki* and *Gomi*, alone or in combination, do not teach, show, suggest, or otherwise render obvious a first valve to regulate a first carrier gas flowing through an input into the vessel, a gas analyzer to generate a signal indicative of a concentration of the precursor in the process gas or indicative of a process flow rate, and a controller to receive the signal and is configured to maintain the concentration of the precursor and the volume flow rate of the process gas constant by adjusting the first valve and the second valve, as recited in claim 23, and claims dependent thereon.

Therefore, Applicants respectfully request that the Examiner withdraw the rejection of independent claims 1, 11, and 23 under 35 U.S.C. § 103(a).

Furthermore, the nonobviousness of independent claims 1, 11, and 23 precludes a rejection of claims 3-10, 13-22, and 25-31, which depend therefrom, because a dependent claim is obvious only if the independent claim from which it depends is obvious. *See In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988), *see also* MPEP § 2143.03. Therefore, Applicants request that the Examiner withdraw the 35 U.S.C. § 103(a) obviousness rejection to claims 3-10, 13-22, and 25-31, in addition to the rejection to independent claims 1, 11, and 23.

Claims 2, 12, and 24 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Iseki* and *Gomi*, further in view of *Renken, et al.* (US 4685331, hereafter "*Renken*").

The teachings of *Iseki* and *Gomi* are discussed above.

Renken does not cure the deficiencies of *Iseki* and *Gomi*. *Renken* describes a mass flow controller which controls the flow of a single process stream through a single valve. *Renken* is void of any teachings for pulsing a gas into a process chamber.

Therefore, the Applicants respectfully submit that *Iseki* and *Gomi*, alone or in combination, do not teach, show, suggest, or otherwise render obvious a first valve adapted to regulate a first carrier gas flowing into the vessel, whereby the first carrier gas is combined with the precursor, a gas analyzer having an ultrasonic transducer adapted to generate a signal indicative of a concentration of the precursor in the process gas, and a controller configured to calculate a mass flow rate of the precursor based on the signal, as recited in claim 1, and claims dependent thereon.

Also, the Applicants respectfully submit that *Iseki* and *Gomi*, alone or in combination, do not teach, show, suggest, or otherwise render obvious a precursor monitoring apparatus disposed between the process chamber and the vessel, wherein the precursor monitoring apparatus has a gas analyzer to generate a signal indicative of a concentration of the precursor in the process gas or the signal is indicative of the flow rate of the precursor, and an integral controller to receive the signal, as recited in claim 11, and claims dependent thereon.

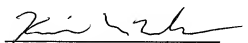
Also, the Applicants respectfully submit that *Iseki* and *Gomi*, alone or in combination, do not teach, show, suggest, or otherwise render obvious a first valve to regulate a first carrier gas flowing through an input into the vessel, a gas analyzer to generate a signal indicative of a concentration of the precursor in the process gas or indicative of a process flow rate, and a controller to receive the signal and is configured to maintain the concentration of the precursor and the volume flow rate of the process gas constant by adjusting the first valve and the second valve, as recited in claim 23, and claims dependent thereon.

Thus, the nonobviousness of independent claims 1, 11, and 23 precludes a rejection of claims 2, 12, and 24, which depend therefrom, because a dependent claim is obvious only if the independent claim from which it depends is obvious. *See In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988), *see also* MPEP § 2143.03. Therefore, Applicants request that the Examiner withdraw the 35 U.S.C. § 103(a) obviousness rejection to claims 2, 12, and 24, in addition to the rejection to independent claims 1, 11, and 23.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the invention as claimed.

The secondary references made of record are noted. However, it is believed that the secondary references are no more pertinent to the Applicants' disclosure than the primary references cited in the Office Action. Therefore, Applicants believe that a detailed discussion of the secondary references is not necessary for a full and complete response to this Office Action.

Having addressed all issues set out in the Office Action, Applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.



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